Profile

Rita Colwell: sea change at the NSF

Barbara Hyde

If you had to choose one word to describe Rita Colwell, it would probably be 'indefatigable'. A small woman who could easily pass for a decade younger than her 63 years, Colwell is renowned for her energy and ability to make things happen. These qualities should serve her well in her next job, as director of the National Science Foundation (NSF) — for which she awaits confirmation by the US Senate.

Colwell's considerable political savvy will also be an asset. Stanley Falkow, president of the American Society for Microbiology, has known Colwell since the early days of her career. "She is a scientist who understands both the bench and the policy makers. She is a facilitator in the best sense of the word," he says. "She can be quiet and thoughtful, but she takes action and brings a real intensity to whatever she does. She has strength, character and the capacity for hard work, and a daunting ability to take on daunting tasks."

Colwell will be the first life scientist to occupy the top position at the agency and the Clinton administration's most senior female scientist. She is especially excited to be joining the NSF at such a crucial time. President Clinton's proposed 1999 budget would provide a 10% increase in funding for the NSF, the largest in the agency's history.

The NSF appointment is the capstone of a career spanning almost four decades, in which Colwell has achieved worldwide renown for her work in marine microbiology and biotechnology. Universities from China to Chile have awarded her honorary degrees and she has been president of many of the major scientific societies in the US, including the American Association for the Advancement of Science.

Colwell started her undergraduate studies at Purdue University as a joint major in literature and chemistry but quickly discovered a strong interest in life sciences. Her future direction was determined by the mentorship of Dorothy Powelson, a bacteriology professor. It was during graduate studies at the University of Washington in Seattle that Colwell developed an interest in marine microbiology, even though the prevailing view was that the sea was too harsh for many forms of life and that the deepest ocean was an azooic zone devoid of life.

The field was hampered by a paucity of methods but Colwell developed a computerized approach to the identification of marine bacteria. This approach is commonplace today but in the early 1960s she was in uncharted territory. "The computer filled the whole attic of the chemistry building and probably had less power than one of today's hand calculators," she recalls. "I had to hard-wire the boards and program in numeric code." She persisted despite detractors. "I remember distinctly a dinner during which one of the field's leading microbiologists said to me, 'Young lady, you cannot use computers to identify bacteria. You must use the human eye and brain to characterize them'." She has been iconoclastic ever since.

Colwell is now considered an expert on cholera and showed in the late 1970s that *Vibrio cholerae* exists in brackish water; previously the disease was thought to be transmitted only by person-to-person contact. She is also well known for the controversial concept of viable but nonculturable bacteria. In the early 1980s, she and her co-workers reported that *Vibrio cholerae* incubated in artificial seawater lost the ability to form colonies when cultured, but remained viable. This idea was not easily accepted but Colwell persisted and now the phenomenon is being found in other microorganisms and investigators are beginning to propose physiological mechanisms to account for this otherwise puzzling bacterial behavior.

Colwell moved to the University of Maryland in 1973. A decade later, as vice president of academic affairs, she recognised the growing importance of biotechnology to the State and raised funding for the University of Maryland Biotechnology Institute, which she has headed since 1987. It encompasses about 700 scientists, staff and students and consists of four centers: computational biotechnology, marine biotechnology (where Colwell will continue to run her lab), molecular medicine and agricultural biotechnology.

As she has moved from microbiology lab to biotechnology institute, Colwell's research interests have expanded similarly. She takes a global view of infectious diseases and is courting controversy again by examining the interrelationships between climate change and microbial life. She is currently co-authoring a book on case histories of outbreaks of malaria, dengue and cholera that illustrate this theory of climate-related epidemiology.

As befits a marine microbiologist, Colwell is an avid sailor. For 20 years, she and her husband travelled all over the US as a dinghy racing team. It's no surprise to hear that they've won lots of trophies, though she claims they're due to his prowess, not hers.

In her new job, Rita Colwell will undoubtedly place a strong emphasis on collaborative research across the scientific disciplines, and there's an expectation that she'll continue to be a strong spokesperson for the biological sciences. Whatever happens, Colwell looks set to bring a breath of fresh air to the NSF.

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